

AURORAS AND SUNSPOTS.

PROBABLE CAUSES OF THE RECENT GREAT ELECTRIC STORM.

Discoveries of the German Scientists at Hartford and of Prof. Brashear— An Immense Beauty Spot on the Solar Surface.

The superstitious who read of sun spots and comets and, gravely shaking their heads, pronounce them harbingers of great disaster, have ample material furnished them by the phenomena which are at present disturbing the heavens, to build up their prophecies of coming evil. The transit of Venus is close at hand, the comet has swept the heavens with its broad tail, and night after night the northern heavens are illumined by magnificent auroras. Many are the speculations and fears of these superstitious people as to the result should the comet rush into the sun or the sun rush into the comet or if some other equally impossible catastrophe should happen. Scientists, however, are watching these phenomena with peculiar interest and admiration, and efforts are constantly being made to discover their cause.

The German astronomers stationed at Hartford, Conn., by the German government to view the transit of Venus, while viewing the sun through a rift in the clouds last Tuesday, discovered an immense sun spot in violent eruption and constantly increasing in size. This discovery excited their intense interest and they have been making efforts to follow its further progress. Their opportunities have been but few, however, owing to the clouds, which obstruct their view of the sun at the proper time for making observations. They think it will soon be visible to the eye with the use of a smoked glass.

Mr. Brashear, in a letter to the *Pittsburg Chronicle*, thus describes the great sun spot as seen by him: "I had noticed, he says, the spot coming on to the sun's edge on Monday, and concluded that it would attain enormous proportions. In the telescope it was an object of singular beauty. Yesterday morning I examined it closely, and I think in all my life I never saw so many beautiful feathery bridges and arms stretching out from the penumbral borders of the spot across and into the great dark nuclei. Every one of them was more or less curved the same way, showing clearly the direction of the cyclonic storm. The penumbra was very much broken up, and the many beautiful forms taken by its extended arms and bridges make up one of the most interesting sun spots on record. Its size is simply enormous. I projected the sun's image so as to give a disc fifty-five millimeters diameter. The spot then measured four millimetres. This would give it nearly one-sixteenth of the sun's diameter, which we will call 880,000 miles. Then one-sixteenth of this would give 55,000 miles as the diameter of the spot. As it was an irregular square, we could safely estimate the spot to contain I should say 2,000,000 square miles. There are a number of smaller spots on the sun, but none so interesting as this one."

It is a theory of astronomers generally that, through intimate magnetic connection, this enormous sun-spot is the cause of the great electric storm which has swept over the earth lately, playing with the telegraphic and magnetic instruments and lighting the heavens with auroras at night. Professor C. A. Young, in treating of the magnetic connection between the sun and the earth says that there are a number of observed instances which render it very probable that every intense disturbance of the solar surface is made sensible to our terrestrial magnetism with the speed of light, so that the effect of any intense disturbance in the sun would reach us in eight and a quarter minutes. The disturbance on the solar surface noticed in 1859 by Carrington and Hodgson were followed immediately by a magnetic storm of unusual intensity, displaying a magnificent aurora on both sides of the Atlantic and in Australia.

Another instance of the concomitance of these magnetic disturbances on the earth and in the sun was noticed by Professor Young while making a series of spectroscopic observations in the Rocky mountains, August, 1872. Simultaneous with the appearance of a large spot then just coming in view around the edge of the sun, there was a great magnetic disturbance on the earth. The instruments in use by Professor Young's party were so disturbed that they could not be operated, and reports from Greenwich and Stonyhurst showed magnetic disturbance at precisely the same time.

In comparing auroral observations with those of the sun-spots, it has been found that there is almost perfect parallelism between their courses. These sun disturbances reach their maximum every ten or eleven years, and the maximum of the present magnetic storm is due some time in 1883, and this high pressure is the cause of the magnetic phenomena now presented.